aion
DIY GUITAR EFFECTS

PROJECT NAME
NYSIAD

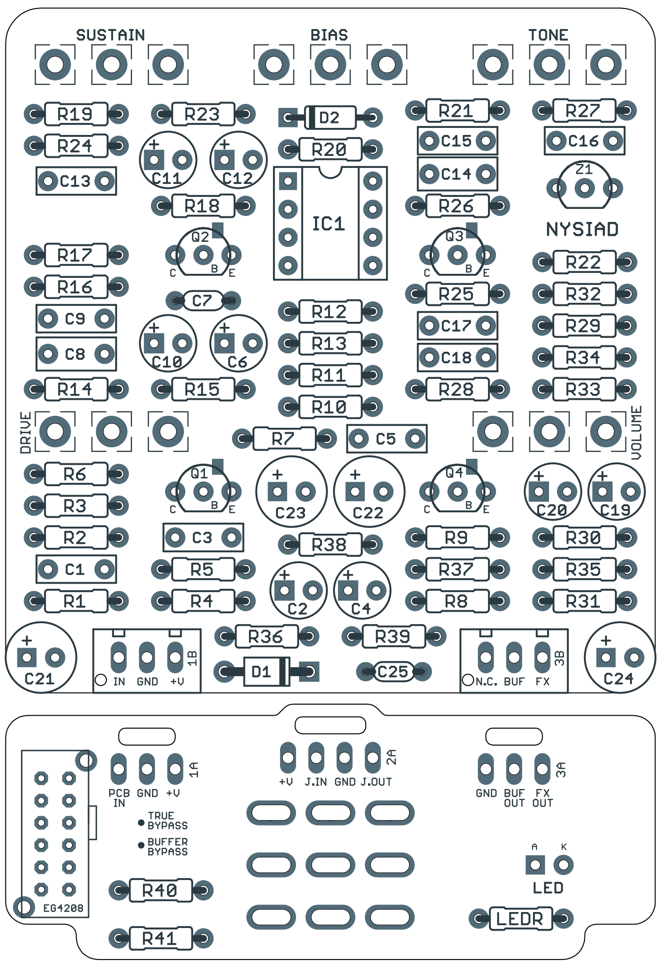
BASED ON
Cornish NG-3

BUILD DIFFICULTY
Intermediate

EFFECT TYPE
Misbiased silicon fuzz

DOCUMENT VERSION
2.0.0 (2023-10-06)

PROJECT SUMMARY
A variable-bias silicon fuzz designed to emulate "imminent amp death", the sound of a blown power tube or output transformer right before it all goes up in smoke.



Actual size is 2.3" x 2.43" (main board) and 2.3" x 0.87" (bypass board).

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INTRODUCTION

The Nysiad Silicon Fuzz is adapted from the Cornish NG-3, first released in 2010 as the successor to the NG-2 and N.G. Fuzz, both favorites of Lou Reed who owned several of each, and also used by John Mayer on his version of Crossroads. Aion FX traced the NG-3 in 2023.

The NG-3 is designed to simulate "imminent amp death", the sound of a bad output transformer or power tube right before the fuse blows (or worse). You can get some fairly traditional sounds from it if the bias knob is all the way up, but once you start to dial it down, the tone quickly turns into a glitchy mess, complete with gating, sag, feedback, velcro, instability, and anything else you'd associate with a misbiased fuzz.

The closest comparison is probably the ZVEX Fuzz Factory. They're different animals, but if you like the sounds you can get from that circuit then you'll probably like this one too.

According to Pete, the NG-3 is the same as the NG-2 except that the internal bias control has been made into an external knob. In truth, it's not quite that simple, though probably mostly accurate. Our tracing journal includes extensive analysis and speculation on this question if you're curious.

The Nysiad is a direct clone of the original Cornish pedal based on our trace, with the one addition that buffered bypass can be changed to true bypass with a slide switch, as on our other Cornish adaptations.

USAGE

The Nysiad has the following controls:

- **Drive** is the amount of clean boost from the op-amp gain stage at the beginning. As it's boosted, it overloads the first transistor stage, creating the initial fuzz tone.
- **Sustain** controls the signal level coming out of the first transistor gain stage, which affects how much the second transistor gain stage is overloaded, adding to the fuzz tone.
- **Bias** sets the bias of the second transistor stage, which sets how much of the signal is amplified. At full clockwise, the bias is normal and full signal is passed. As it's turned down, gating effects and "velcro" artifacts start to appear.
- **Tone** is a basic bass/treble filter identical to the type found in a Big Muff.
- **Volume** is the overall output.

(continued on next page)

Overview

The NG-3 is great at what it does, but it's very important to understand what exactly that is. The circuit is intended to sound like it's broken, but it's been designed to get these broken sounds in reliable and repeatable ways. This means it can be difficult to tell whether it's been built successfully, especially if you've never played one before.

The two best things you can do to understand the circuit are 1) watch a demo video such as this one from Shnobel Tone, and 2) study the schematic to see exactly how the circuit is arranged, particularly what each control is supposed to do, since the control labels are not overly intuitive.

Beyond that, we're including a few notes from our own experience to help you get the most out of it.

Bias control

When you first complete the Nysiad build, the bias control should be turned all the way up (clockwise). This provides the most "normal" fuzz tone. Drive, Sustain and Tone should be around 12:00.

As you turn down the bias control, the circuit becomes more and more unstable and glitchy, especially at higher Drive and Sustain settings.

Drive vs. Sustain

These controls seem redundant at first glance, but think of them as inter-stage gain controls. Drive is the signal level going into transistor stage 1, and Sustain is the signal level going into transistor stage 2. The first transistor stage overloads differently than the second, so high Drive and low Sustain sounds very different than low Drive and high Sustain.

Generally speaking, the Sustain control has a stronger interaction with the Bias control. For example, with Bias at 12:00 and Sustain toward the bottom half of the rotation, there's a very strong "sag" effect, almost like an over-eager compressor that reduces the gain too much before swelling back to normal. The Drive level has much less of an impact on this effect.

Noise

The noise floor will be amplified a great deal at higher Drive and Sustain levels, so if you have single-coil pickups, you'll have better luck with one of the noise-canceling positions. This is less of an issue as Bias is turned down since there's a noise-gating effect when nothing is being played.

PARTS LIST

This parts list is also available in a spreadsheet format which can be imported directly into Mouser for easy parts ordering. Mouser doesn't carry all the parts (most notably potentiometers) so the second tab lists all the non-Mouser parts as well as sources for each.

View parts list spreadsheet →

PART	VALUE	TYPE	NOTES
R1	10M	Metal film resistor, 1/4W	
R2	1k	Metal film resistor, 1/4W	
R3	120k	Metal film resistor, 1/4W	
R4	120k	Metal film resistor, 1/4W	
R5	200k	Metal film resistor, 1/4W	
R6	7k5	Metal film resistor, 1/4W	
R7	10k	Metal film resistor, 1/4W	
R8	51R	Metal film resistor, 1/4W	
R9	100k	Metal film resistor, 1/4W	
R10	1M	Metal film resistor, 1/4W	
R11	1M	Metal film resistor, 1/4W	
R12	3k3	Metal film resistor, 1/4W	
R13	10k	Metal film resistor, 1/4W	
R14	1k5	Metal film resistor, 1/4W	
R15	150k	Metal film resistor, 1/4W	
R16	33k	Metal film resistor, 1/4W	
R17	1k	Metal film resistor, 1/4W	
R18	4k3	Metal film resistor, 1/4W	
R19	30k	Metal film resistor, 1/4W	
R20	82R	Metal film resistor, 1/4W	
R21	220k	Metal film resistor, 1/4W	
R22	10k	Metal film resistor, 1/4W	
R23	68k	Metal film resistor, 1/4W	
R24	30k	Metal film resistor, 1/4W	
R25	12k	Metal film resistor, 1/4W	
R26	28k	Metal film resistor, 1/4W	
R27	28k	Metal film resistor, 1/4W	
R28	330k	Metal film resistor, 1/4W	
R29	100k	Metal film resistor, 1/4W	
R30	120k	Metal film resistor, 1/4W	
R31	120k	Metal film resistor, 1/4W	
R32	200k	Metal film resistor, 1/4W	

PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
R33	5k1	Metal film resistor, 1/4W	
R34	10k	Metal film resistor, 1/4W	
R35	91R	Metal film resistor, 1/4W	
R36	100R	Metal film resistor, 1/4W	
R37	150R	Metal film resistor, 1/4W	
R38	150R	Metal film resistor, 1/4W	
R39	150R	Metal film resistor, 1/4W	
R40	91R	Metal film resistor, 1/4W	
R41	51k	Metal film resistor, 1/4W	
LEDR	10k	Metal film resistor, 1/4W	LED current-limiting resistor. Adjust value to change LED brightness.
C1	100n	Film capacitor, 7.2 x 2.5mm	
C2	4.7uF	Electrolytic capacitor, 4mm	
C3	1n	Film capacitor, 7.2 x 2.5mm	
C4	22uF	Electrolytic capacitor, 5mm	
C5	100n	Film capacitor, 7.2 x 2.5mm	
C6	4.7uF	Electrolytic capacitor, 4mm	
C7	100pF	MLCC capacitor, NP0/C0G	
C8	220n	Film capacitor, 7.2 x 2.5mm	
C9	1n	Film capacitor, 7.2 x 2.5mm	
C10	22uF	Electrolytic capacitor, 5mm	
C11	4.7uF	Electrolytic capacitor, 4mm	
C12	4.7uF	Electrolytic capacitor, 4mm	
C13	1n	Film capacitor, 7.2 x 2.5mm	
C14	220n	Film capacitor, 7.2 x 2.5mm	
C15	10n	Film capacitor, 7.2 x 2.5mm	
C16	10n	Film capacitor, 7.2 x 2.5mm	
C17	100n	Film capacitor, 7.2 x 2.5mm	
C18	1n	Film capacitor, 7.2 x 2.5mm	
C19	4.7uF	Electrolytic capacitor, 4mm	
C20	22uF	Electrolytic capacitor, 5mm	
C21	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C22	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C23	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C24	220uF	Electrolytic capacitor, 6.3mm	Power supply filter capacitor.
C25	100n	MLCC capacitor, X7R	Power supply filter capacitor.
D1	1N5817	Schottky diode, DO-41	
D2	1N914	Fast-switching diode, DO-35	

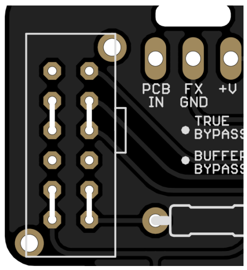
PARTS LIST, CONT.

PART	VALUE	TYPE	NOTES
Q1	BC549C	BJT transistor, NPN, TO-92	
Q2	BC549C	BJT transistor, NPN, TO-92	
Q3	BC549C	BJT transistor, NPN, TO-92	
Q4	BC549C	BJT transistor, NPN, TO-92	
Z1	LM4040DIZ-5.0	Zener / voltage reference, TO-92	Can also use LM4040CIZ-5.0.
IC1	TL071	BJT transistor, NPN, TO-92	
IC1-S	DIP-8 socket	BJT transistor, NPN, TO-92	
DRIVE	100kA	16mm right-angle PCB mount pot	
SUSTAIN	100kB	16mm right-angle PCB mount pot	
TONE	100kB	16mm right-angle PCB mount pot	
BIAS	100kB	16mm right-angle PCB mount pot	
VOLUME	250kA	16mm right-angle PCB mount pot	
TB-BUF	4PDT slide	Slide switch, 4PDT	E-Switch EG4208 (4mm lever) or EG4208A (6mm lever)
IN	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
OUT	1/4" mono	1/4" phone jack, closed frame	Switchcraft 111X or equivalent.
DC	2.1mm	DC jack, 2.1mm panel mount	Mouser 163-4302-E or equivalent.
FSW	3PDT	Stomp switch, 3PDT	
ENC	125B	Enclosure, die-cast aluminum	Can also use a Hammond 1590N1.

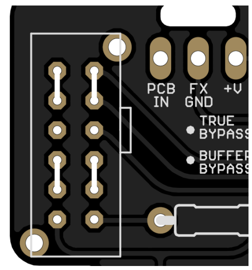
Bypassing the true bypass / buffer switch

The E-Switch EG4208 slide switch used for the true bypass/buffer selector is available from Mouser Electronics but may not be accessible to everyone. If you are unable to obtain it, you can hard-wire the switch to either true bypass mode or buffered mode by soldering jumpers to the switch pads.

BUFFER BYPASS



TRUE BYPASS



Transistor substitutions

The BC549C and BC550C are interchangeable with no difference in sound, so either can be used. If you want to substitute a different transistor, you'll want one with very high hFE, in the 600s.

The PCB layout uses the B-C-E transistor pinout, which is the opposite of the E-B-C convention used by transistors with a "2N" prefix such as the 2N3904. The closest substitute in this series is the 2N5089. If using these, rotate them 180 degrees. Use a multimeter to check the pinout if you're not sure.

The transistor outlines also include a rectangular collector pad above the "B" and "E" pins so that a SMD transistor such as the BC849C can be used.

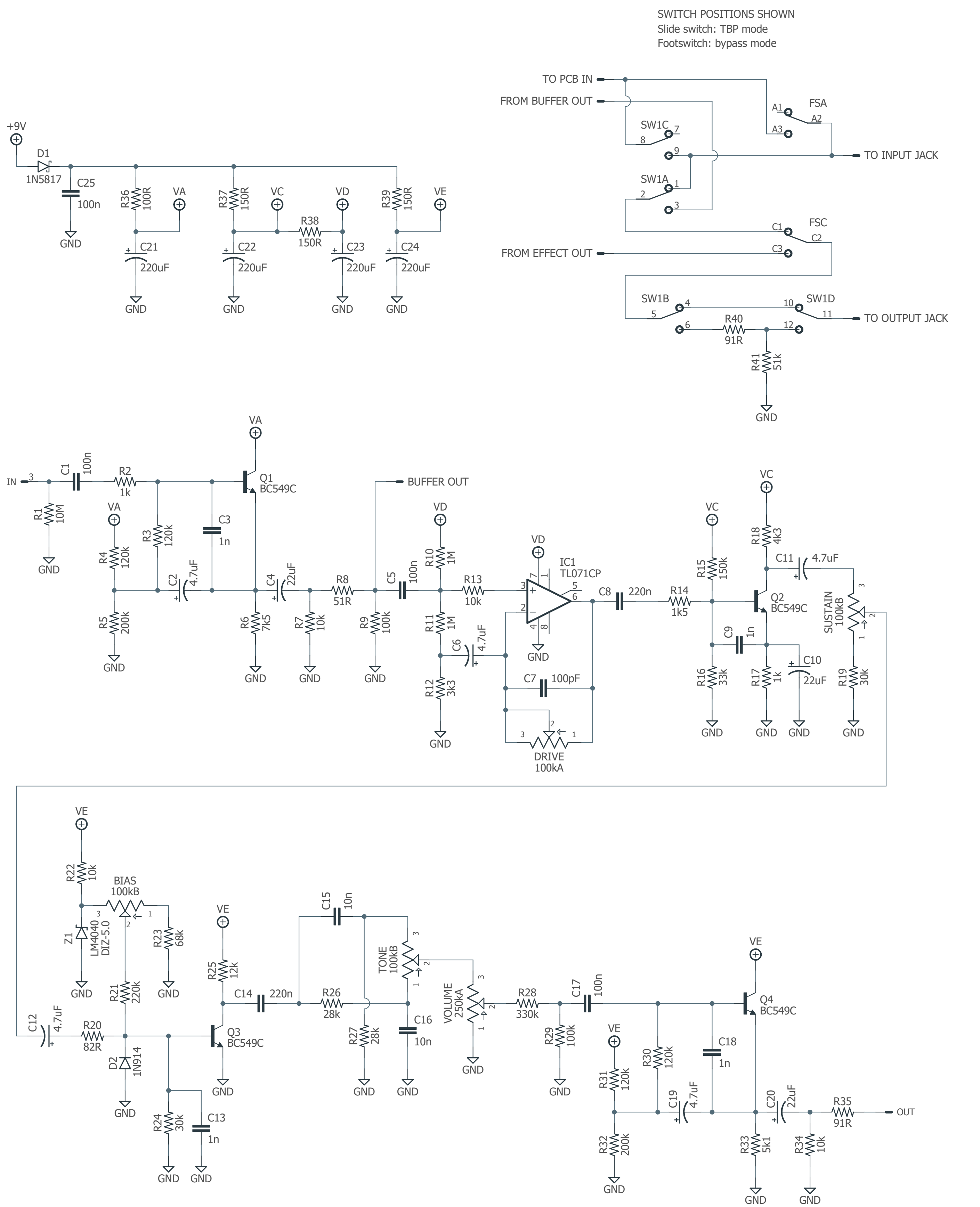
Z1 zener/reference voltage

Z1 (LM4040DIZ-5.0) is a micropower zener diode in a TO-92 transistor package, intended for high-precision voltage references at low operating currents. Accordingly, the bias resistors (R21-23 and the Bias pot) are a lot larger than you'd expect.

These micropower types are designed to be extremely stable at low currents and they do not need a filter capacitor according to the datasheet. If Z1 was a standard zener diode, it would likely not drop its full 5V voltage and would be noisy or unstable without a filter capacitor.

The LM4040 is the only part that will work properly without circuit modifications. The tolerance grade suffix (A = 0.1%, B = 0.2%, C = 0.5%, or D = 1%) is unimportant, so you can substitute whichever type is easiest to find as long as it's 5.0V. The traced NG-3 used the LM4040DIZ-5.0, which is the cheapest type, but the CIZ has been used in the Cornish OC-1.

SCHEMATIC


SWITCH POSITIONS SHOWN
Slide switch: TBP mode
Footswitch: bypass mode
TO PCB IN
FROM BUFFER OUT
SW1C 7 8 9
SW1A 1 2 3
FSA A1 A2 A3
TO INPUT JACK
FSC C1 C2 C3
FROM EFFECT OUT
SW1B 4 5 6
SW1D 10 11 12
R40 91R
R41 51k
TO OUTPUT JACK
GND
+9V
D1 1N5817
C25 100n
R36 100R
VA
R37 150R
VC
R38 150R
VD
R39 150R
VE
C21 220uF
C22 220uF
C23 220uF
C24 220uF
IN 3
C1 100n
R1 10M
R2 1k
R3 120k
R4 120k
R5 200k
C2 4.7uF
C3 1n
Q1 BC549C
R6 7k5
C4 22uF
R7 10k
R8 51R
BUFFER OUT
R9 100k
C5 100n
R10 1M
R11 1M
R12 3k3
C6 4.7uF
R13 10k
IC1 TL071CP
C7 100pF
DRIVE 100kA
C8 220n
R14 1k5
R15 150k
R16 33k
C9 1n
R18 4k3
Q2 BC549C
R17 1k
C10 22uF
C11 4.7uF
SUSTAIN 100kB
R19 30k
R22 10k
BIAS 100kB
Z1 LM4040 DIZ-5.0
R23 68k
R21 220k
C12 4.7uF
R20 82R
D2 1N914
R24 30k
C13 1n
R25 12k
Q3 BC549C
C14 220n
C15 10n
R26 28k
R27 28k
TONE 100kB
C16 10n
VOLUME 250kA
R28 330k
R29 100k
C17 100n
R30 120k
C18 1n
R31 120k
R32 200k
C19 4.7uF
Q4 BC549C
R33 5k1
C20 22uF
R34 10k
R35 91R
OUT

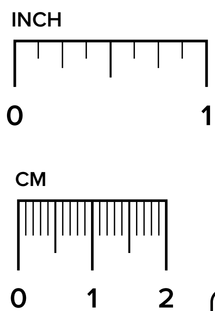
DRILL TEMPLATE

Cut out this drill template, fold the edges and tape it to the enclosure. Before drilling, it's recommended to first use a center punch for each of the holes to help guide the drill bit.

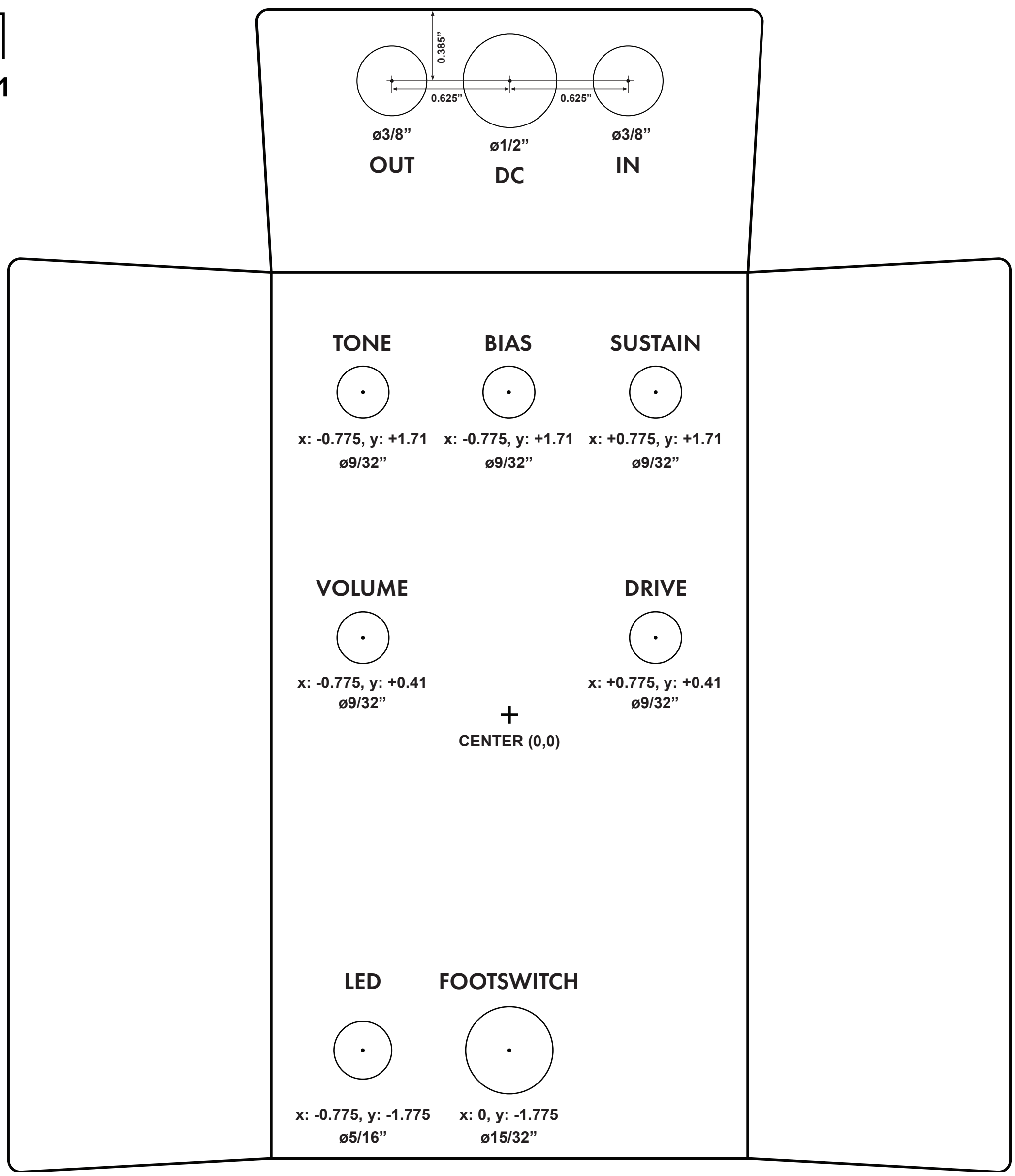
Ensure that this template is printed at 100% or "Actual Size". You can double-check this by measuring the scale on the printed page.

Top jack layout assumes the use of closed-frame jacks like the Switchcraft 111X. Open-frame jacks will not fit in layouts with 5 or more knobs due to the placement of the DC jack.

LED hole drill size assumes the use of a 5mm LED bezel, available from several parts suppliers. Adjust size accordingly if using something different, such as a 3mm bezel, a plastic bezel, or just a plain LED.

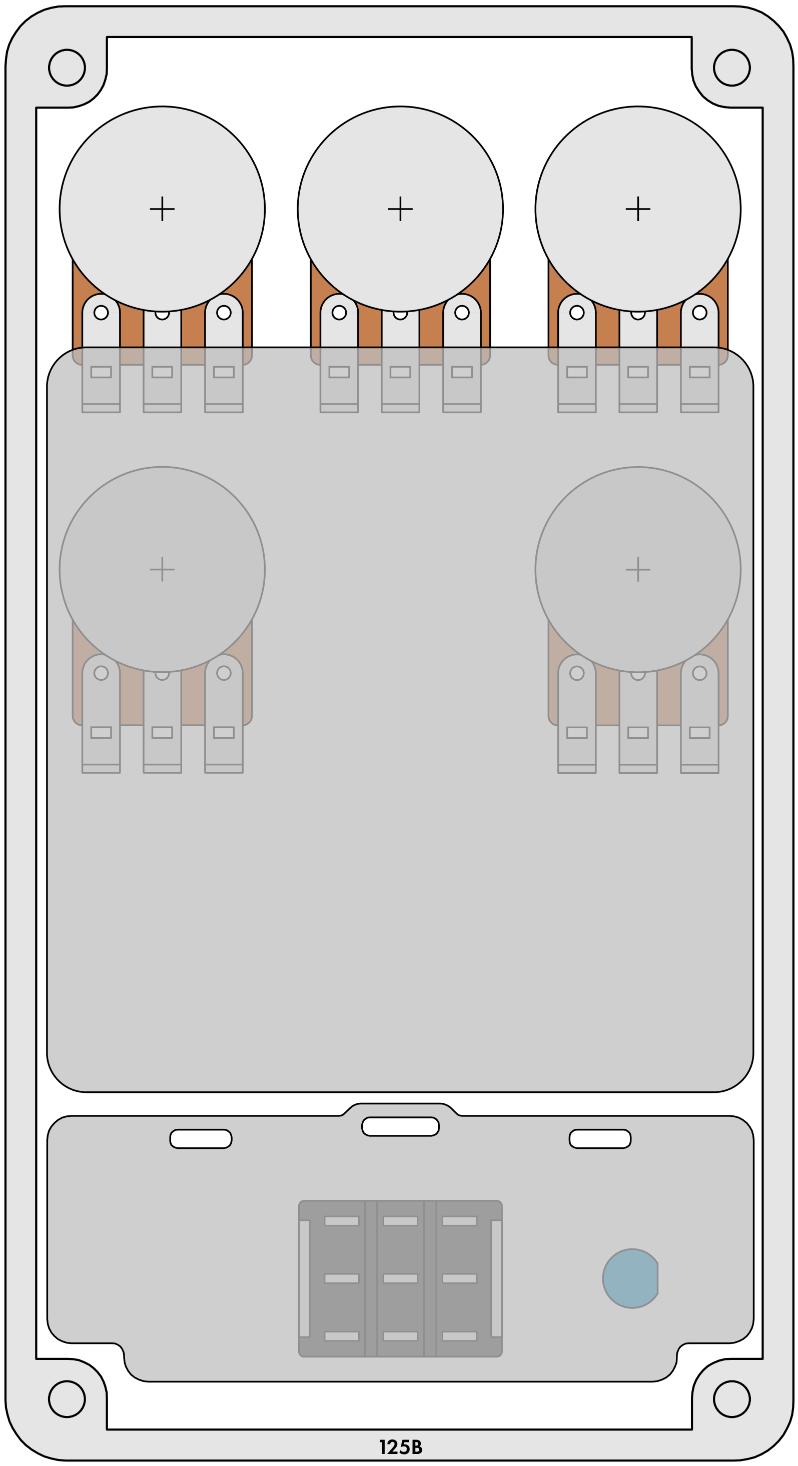


125B

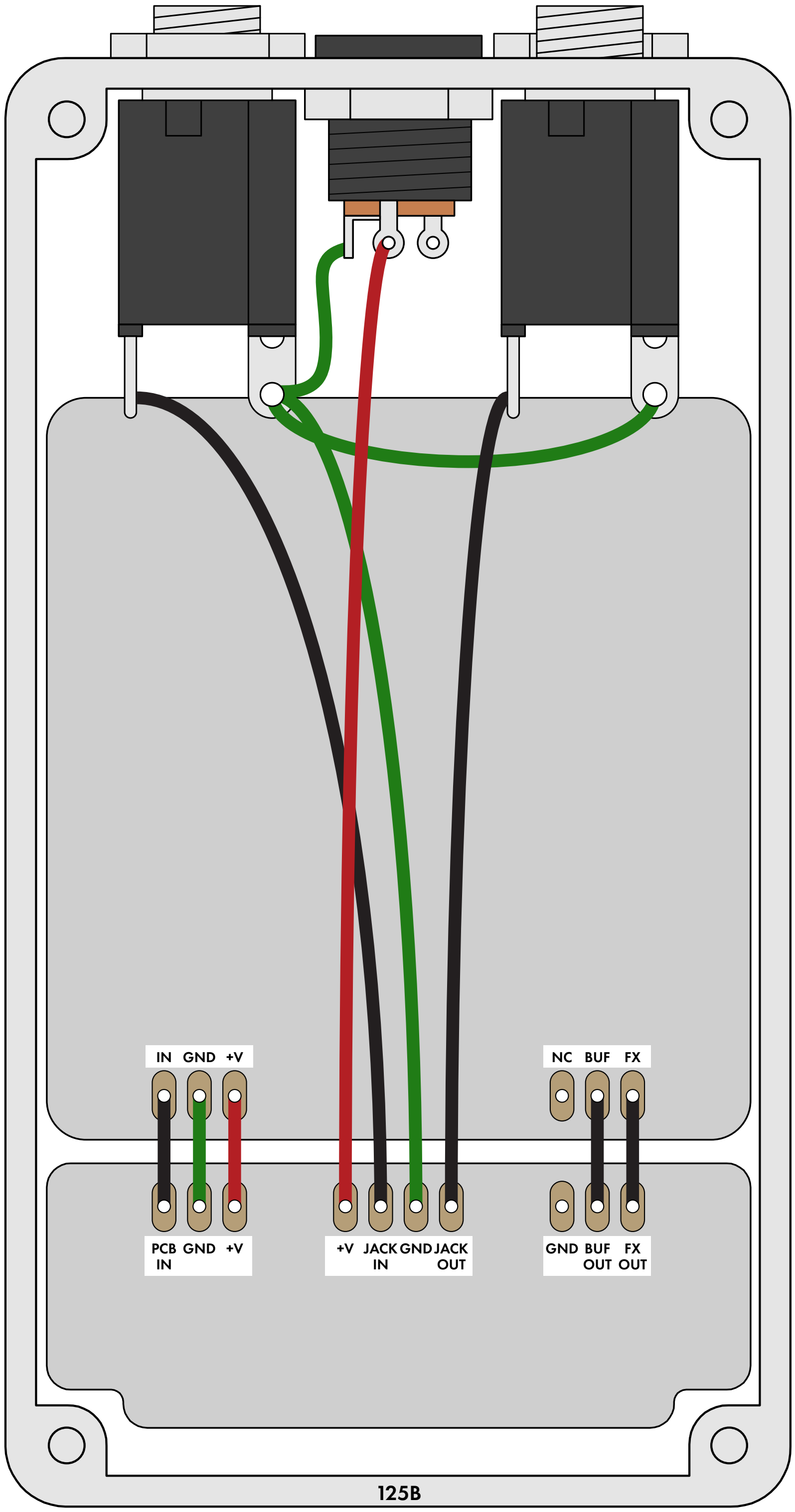


ENCLOSURE LAYOUT

Enclosure is shown without jacks. See next page for jack layout and wiring.



WIRING DIAGRAM



LICENSE & USAGE

No direct support is offered for these projects beyond the provided documentation. It's assumed that you have at least some experience building pedals before starting one of these. Replacements and refunds cannot be offered unless it can be shown that the circuit or documentation are in error.

All of these circuits have been tested in good faith in their base configurations. However, not all the modifications or variations have necessarily been tested. These are offered only as suggestions based on the experience and opinions of others.

Projects may be used for commercial endeavors in any quantity unless specifically noted. No attribution is necessary, though a link back is always greatly appreciated. The only usage restrictions are that **(1) you cannot resell the PCB as part of a kit without prior arrangement**, and **(2) you cannot "goop" the circuit, scratch off the screenprint, or otherwise obfuscate the circuit to disguise its source**. (In other words: you don't have to go out of your way to advertise the fact that you use these PCBs, but please don't go out of your way to hide it. The guitar effects industry needs more transparency, not less!)

DOCUMENT REVISIONS

2.0.0 (2023-10-06)
New PCB layout to add P-2 compatibility based on our trace. Changed transistor outlines to BC549/550 convention. Changed R7 to 10k and added information on this change to the build notes section.

1.0.2 (2023-08-04)
Changed R39 to 51k and added information on this change to the build notes section.

1.0.1 (2020-04-06)
Added notes about resistors in first transistor stage (R18 and R19).

1.0.0 (2019-03-14)
Initial release.